Wisconsin Department of Natural Resources
Wisconsin's Northern State Forest Assessments:
Regional Ecology

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Executive Summary

This report is focused on assessment of **regional ecological information** for the area including and surrounding the Northern Highland-American Legion (NHAL) and the Brule River State Forests. Within the report, information has been organized into four major sections including:

1) The *introduction* describing the charge of the team and the process used in the assessment.
2) *Background ecological information* that was gathered and analyzed to determine the ecological management opportunities for the NHAL and Brule River State Forests. This information was considered at 3 spatial scales (Province, Section, and Subsection) using the hierarchical format of the National Hierarchical Framework of Ecological Units (NHFEU).
3) Regionally significant *ecological management opportunities* that could be addressed within the NHAL and Brule River State Forests.
4) *Ongoing assessment projects and future needs* for work relative to regional ecology needs.

The approach of this analysis was to assess the ecological resources at a large regional scale, then at smaller, more refined scales, to determine the ecological context and ecological management opportunities for the NHAL and Brule River State Forests. This approach should result in the identification of management opportunities for these state forests that maintain sustainable ecological resources for both the state and region. Although the focus of this report is on the NHAL and Brule River State Forests, these analyses of ecological resources at different regional scales should be useful for other Department planning efforts.

The NHAL and Brule River State Forests are located in northern Wisconsin. Ecologically, these state forests are placed within large-scale ecoregions and subregions using the NHFEU. These state forests are within Province 212, the Laurentian Mixed Forest. This Province describes an ecoregion which is recognized by major regional climate regimes and gross physical geography. Province 212 is located across the northern portion of the Lake States eastward through Pennsylvania, New York, and Maine. Natural history for Province 212 (10,000's of square miles) is described within this report for the northern forests (primarily Wisconsin) including the glaciation, soils, hydrology, vegetation, flora and fauna. Several broad ecological problems exist within Province 212 including ecological simplification, fragmentation and environmental pollution. Within the Regional Ecology Assessment, we first recognize that the state forests lie within these very large ecological units and they are an integral piece in the mosaic of land uses and ownerships. By providing a general assessment of the ecological resources in these large areas and recognizing the regional context of very broad environmental issues, the significance of unique state forest resources can be defined. Potential ecological management opportunities for

the state forests can be identified that are consistent with and beneficial to the overall regional ecology.

Finer ecological levels (Section and Subsection) recognized by the NHFEU better focus ecological themes that are present in the two state forests. The Section and Subsection levels are ecological units characterized by combinations of climate, geomorphic processes, topography, and stratigraphy. Sections and Subsections typically range in size from 1000's to 100's of square miles. These large-scale natural patterns and processes influence the moisture availability and exposure to radiant solar energy, that in turn affects relatively finer scale hydrology, soil forming processes, and potential natural communities. Background ecological information was gathered for each of these ecological units. Generally, the historical context of climate and geology describes the development of soils, landforms, hydrology, past and present vegetation and the faunal attributes of the units.

The NHAL State Forest lies within the north-central Wisconsin portion of Section 212J (Southern Superior Uplands), and primarily in Subsection 212Jm (Northern Highland Pitted Outwash) with a small amount of the western edge of the NHAL in Subsection 212Jc (Winegar Moraines). The Brule River State Forest lies in the northwestern Wisconsin portion of Sections 212J (Southern Superior Uplands) and 212K (Western Superior). The Brule River State Forest occurs in parts of Subsections 212Ja (Lake Superior Clay Plain), 212Ka (Bayfield Sand Plains), and 212Kb (Mille Lacs Uplands). It is within these Sections and Subsections that we are able to delineate significant ecological themes that may focus land management opportunities within the state forests.

Regionally Significant Ecological Resources Surrounding the NHAL State Forest

Province 212, Section 212J. The NHAL is recognized as a major state property within Section 212J (Southern Superior Uplands), and more specifically within Subsection 212Jm (Northern Highland Pitted Outwash). Significant ecological resources relative to the NHAL State Forest in Section 212J include the high density of kettle lakes, the dry forest communities, and the matrix of mesic forest vegetation. The headwaters for many streams and rivers begin in this Section and are important to the water volume and water quality downstream. Early seral stages of aspen and young northern hardwoods, including sugar maple, basswood, and yellow birch are common and important features of this Section. A variety of mixed stands occur with conifers, usually eastern white pine and balsam fir, with small admixtures of eastern hemlock. These diverse forest types make up a large continuous block of forestland. Greater than 3.75 million acres of land, or 26% of Section 212J is publicly owned.

Subsection 212Jc. A small portion of the NHAL State Forest is located in Subsection 212Jc (Winegar Moraines). Significant ecological resources that occur in this Subsection are large wetlands including forested, shrub, and herbaceous types, as well as bogs. Kettle lakes are quite common but are often acidic and low in nutrients. Many cedar swamps exist which are important as deer wintering yards. Uplands contain mesic hardwood forest communities which have been fragmented by intensive forest management. However, the potential to manage for forest interior species occurs here because the matrix is primarily comprised of forests. This area may be suitable for wolf management because of the low density of roads and lack of human development. Given current land management, this area is important for species requiring sapling and young upland deciduous forest habitats. Habitats most at risk or in need of management attention are mature upland deciduous forests, marshes, mature lowland deciduous forests, closed lowland conifers, and shrub habitats. Species in need of management

attention in this Subsection are the Canada warbler and arctic shrew in closed lowland conifers; black-throated blue warbler and four-toed salamander in mature upland deciduous forest; northern goshawk in mature upland mixed forests; star-nosed mole in open lowland conifers; golden-winged warbler and pygmy shrew in shrub swamps.

Subsection 212 Jm. Significant ecological resources on the NHAL State Forest that occur in Subsection 212Jm (Northern Highland Pitted Outwash) include high densities of kettle lakes, the headwaters for many major streams, large open acid peatlands and sedge meadows, and extensive dry forest types. Currently, the NHAL forest contain a high density and composition of aspen and are important for species that utilize saplings and young upland deciduous forest as habitat. At the subsection level there is considerable potential for large-block management since the forests are only moderately fragmented and connections might be made with the Nicolet-Chequamegon and Ottawa National Forests. Within the subsection, in high density lake areas, the shoreline is highly developed with second homes and roads that makes much of this area unsuitable for species which require large unfragmented blocks of habitat, such as the wolf. The area holds high management potential for a variety of neotropical migrant birds, bald eagles, ospreys, common loons, and aquatic features. Habitats most in need of management attention are lakes, mature upland conifers, mature upland mixed coniferous-deciduous forests, mature and sapling upland deciduous forests, sedge meadows, and bogs. Species in need of management attention include the mudpuppy in lakes; Connecticut and Blackburnian warbler in mature upland conifers; black-throated blue warbler and four-toed salamander in mature deciduous forests; northern goshawk in mature upland mixed forests; star-nosed mole in open lowland conifers; golden-winged and chestnut-sided warbler and pygmy shrew in deciduous saplings.

Regionally Significant Ecological Resources Surrounding the Brule River State Forest

Sections 212J and 212K. The Brule River State Forest is a long linear property which dissects Sections 212J (Southern Superior Uplands) and 212K (Western Superior), and Subsections 212Ja (Lake Superior Clay Plain), 212Ka (Bayfield Sand Plains), and 212Kb (Mille Lacs Uplands). Significant ecological resources relative to the Brule River State Forest in Section 212J include the boreal forests that occur in the clay plains along Lake Superior and the Great Lakes shoreline communities. Significant ecological resources relative to the Brule River State Forest in Section 212K are the globally rare pine barrens community, large sedge meadows and marshes, large wooded swamps and acid peatlands, the Brule River system, and large roadless and undeveloped areas. This eastern portion of Section 212K in Wisconsin represents a significant opportunity for large-scale pine barrens management because 44% of the land is in public ownership.

Subsection 212Ja. Significant ecological resources of the Brule River State Forest that occur in Subsection 212Ja (Lake Superior Clay Plain) include the spruce-fir (boreal) forest, sand dune and beach communities, and freshwater estuaries along Lake Superior, as well as other unique and diverse Great Lakes plant communities. The Bois Brule River is a significant river in the Subsection with a unique fishery along with management problems and opportunities. Because of former agricultural use, many fallow fields remain throughout the Subsection and there may be an opportunity for grassland bird management in some areas. This Subsection also has many important bird rookeries and spawning areas for fish. Mature upland conifer forests, Great Lakes shorelines, marshes, and grassland habitats are in need of management attention in the Subsection. Species such as Connecticut, Blackburnian, and Cape May warbler in mature

upland conifers; trumpeter swan in marshes; common tern and piping plover along the Lake Superior shoreline are in need of management attention.

Subsection 212Ka. Significant ecological resources of the Brule River State Forest that occur in Subsection 212Ka (Bayfield Sand Plains) include the pine barrens community, with a unique and diverse prairie flora and fauna. Current forest cover types include large red pine plantations, jack pine, and scrub oak stands with an emphasis on the exclusion of fire. It must be noted that these systems were largely fire dependent and the potential for large fires still exists. Road density is moderately high. Habitats most in need of management attention are barrens, grasslands, marshes, sedge meadows, and mature upland conifer forests. Species in need of management attention within the Subsection are smooth green snake, Franklin's ground squirrel, Plains pocket gopher, prairie skink, and sharptailed grouse in barrens; western fox snake in grasslands; trumpeter swans, Blanding's turtle, and Wilson's phalarope in marshes; sharptailed sparrow, yellow rail, LeConte's sparrow and sedge wren in sedge meadows; and Connecticut warbler in mature upland coniferous forests. Male Kirtland's warblers have been rare occurrences in the Subsection.

Subsection 212Kb. A small portion of the Brule River State Forest is located in Subsection 212Kb (Mille Lacs Uplands). The state forest contributes to significant resources of the Subsection including large undeveloped and roadless areas, most of which are in public ownership (66%). This area also contains large swamps and acid peatlands interspersed with northern hardwood forests on the uplands. This area is important to timber wolf and moose because it forms a large roadless area connected to Minnesota source populations. Habitats most in need of management attention in this Subsection are mature upland deciduous forests, mature lowland deciduous forests, and closed lowland conifer forests. Species in need of management attention include Canada warbler and arctic shrew in closed lowland conifers; black-throated blue warbler, veery, and four-toed salamander in mature upland deciduous forests; star-nosed mole in open lowland conifers; and golden-winged warbler in upland deciduous saplings.

Regionally Significant Management Opportunities for the NHAL and Brule River State Forest

Regionally significant management opportunities for the NHAL State Forest and Brule River State Forest were examined to determine how management of these properties could significantly contribute to the maintenance and improvement of natural communities in the Great Lakes region. A top-down approach was used. This analysis only addressed the opportunities to manage natural communities within the larger-scale region. It did not address the amount of public or private land ownership, existing agency management programs, quality or size of existing natural communities, fragmentation or juxtaposition of communities, compatible land types, age, or successional stage of communities. All these factors need to be considered when determining the feasibility of managing for a given community type on state forests by the assessment teams or master planning groups working on a more refined scale.

For the **NHAL State Forest**, opportunities exist to manage for pine dominated, dry to dry-mesic forests at a large scale. An important opportunity exists to manage mesic hardwood hemlock types because significant stands of more mature stages currently exist. Numerous large, relatively undisturbed bogs and conifer swamps, as well as rare and uncommon rich fens and rice marshes, occur on the property. The opportunity to protect and manage these types could be pursued. There is an opportunity to manage for large-scale, extensive forests because fragmentation is moderate. Extensive forests could benefit forest interior species, including

neotropical migrant birds, as well as disturbance-sensitive predators and certain habitat specialists. This property contains a globally significant concentration of freshwater kettle lakes, many of which have rare aquatic plants and invertebrates. Development pressure on these lakes is very high. Many rare aquatic plants and invertebrates also occur in the rivers on this property. Regionally significant breeding populations of bald eagle, osprey, common loon, and other water dependent wildlife occur on the property. Opportunities to preserve and restore these aquatic resources could be pursued. Three national forests and several state-owned properties are in close proximity to the NHAL State Forest making large-scale management possible.

On the **Brule River State Forest**, although no one community stands out as a major significant management opportunity, this property is unique. The combinations of community types (i.e. boreal, dry/dry-mesic/northern mesic/northern wet mesic/northern wet forests) on the Brule River State Forest represent an excellent array of diverse forest types and an exceptional quality of these community types in the state. In addition, the conifer-dominated forests along the Bois Brule River support significant concentrations of boreal birds and rare plants -- many at the southern edge of their range. Surveys have indicated that 23 rare plant species and 40 rare animal species occur on or adjacent to the property.

Although the boreal community exists broadly in other parts of the continent, an opportunity exists to restore spruce-fir forests on the clay plain of the property. The spruce-fir community, although never abundant statewide, was formerly more extensive and is now rare in Wisconsin. Opportunities for management of high quality stands of conifer swamp, pine forest, and alder thicket, many with rare species, occur along the upper stretches of the Bois Brule River. The management opportunity for spring ponds and seepages along this stretch of the river is also significant. Seepage lakes, spring ponds, and spring runs support rare aquatic invertebrates. Small remnants of the globally rare pine barrens community exist on the property and adjacent lands. Small-scale restoration of this community type exists. Small-scale restoration of pine forest and northern hardwoods may be possible. The size and shape of the property and dominant land uses in the immediate landscape limit some large-scale conservation opportunities.

Although much information was gathered for development of this report, only selected data were featured here. Many existing projects should be recognized as potential information sources relevant to the state forest master planning efforts. Additional needs certainly exist for future assessment work with inventories, the development of classification systems or cross-walks between systems, and research projects. The final portion of this report refers to additional ecological assessment projects in progress, either by the DNR or by other agencies, and identifies a list of future needs.